Magnet Selection Quick Reference

Material Families · NdFeB Grades · Coatings · Tolerances · RFQ Checklist

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1 Choose the Material Family

Material	(BH)max	Max operating temp	Corrosion resistance	Cost	Best choice when
Sintered NdFeB	33–53 MGOe	80–200 °C (by grade)	Poor — coating required	$$$	Highest strength in the smallest volume — motors, robotics, medical devices, sensors.
Sintered SmCo	16–32 MGOe	250–350 °C	Good	$$$$	High temp *and* high strength — aerospace, downhole oil & gas, high-speed rotors.
Ferrite (Ceramic)	3–5 MGOe	~250 °C	Excellent	$	Cost drives the decision and larger size is acceptable — speakers, separators, small DC motors.
AlNiCo	1.5–10 MGOe	450–550 °C	Excellent	$$$	Extreme temperature stability — instrumentation, sensors, meters. Low coercivity: easy to demagnetize.

Rule of thumb: decide by **temperature** → **required flux** → **environment** → **cost**, in that order.

2 Pick the NdFeB Grade — N Number + Temperature Suffix

2a · The N number = max energy product (BH)max

Grade	(BH)max	Typical use
N35	33–36 MGOe	General industrial, best value
N42	40–43 MGOe	The workhorse for motors
N48	46–49 MGOe	Compact, weight-sensitive designs
N52	50–53 MGOe	Maximum strength; more brittle, higher cost

2b · The suffix = temperature capability

Suffix	Min Hcj	Max operating temp
(none)	≥12 kOe	≈80 °C
M	≥14 kOe	≈100 °C
H	≥17 kOe	≈120 °C
SH	≥20 kOe	≈150 °C
UH	≥25 kOe	≈180 °C
EH	≥30 kOe	≈200 °C

Pick the suffix first, then the N number. An N52 magnet running at 120 °C can lose more flux — permanently — than a 42SH doing the same job. Thin magnets demagnetize more easily, so geometry matters too: tell us your worst-case temperature and dimensions, and we will confirm the safe grade.

3 Select the Coating (NdFeB)

Coating	Thickness	Corrosion protection	Best for
Ni-Cu-Ni	10–20 µm	Good — indoor / mild environments	The default choice: motors, general assemblies, most industrial parts.
Zinc (Zn)	8–15 µm	Good — sacrificial layer	Humid environments at lower cost; matte appearance.
Epoxy	15–30 µm	Very good	Salt-spray and outdoor exposure; also a good surface for adhesive bonding.
Parylene C	5–25 µm	Excellent, very thin & uniform	Medical devices and small precision magnets where every micron counts.
Phosphating	1–5 µm	Temporary protection	Base treatment before bonding or over-coating — common for rotor magnets.

Salt-spray hours depend on the process and test standard — specify your requirement (e.g., 48/96/240 h) rather than asking for “good corrosion resistance”. Coating adds thickness on every surface — allow for it in your tolerances.

4 Define Tolerances & Magnetization

- **Tolerances:** standard machining tolerance is **±0.05 mm**; down to ±0.02 mm is achievable on critical dimensions by grinding — but only specify it where you truly need it, because tighter tolerances cost more.
- **Magnetization direction:** through-thickness (blocks & discs), axial (cylinders & rings), diametrical, or multi-pole (rings & rotors). **Mark it on the drawing** — it cannot be changed after magnetizing.
- **Assemblies:** tell us whether magnets should be delivered magnetized or un-magnetized. Where the design allows, magnetizing after assembly is safer and often improves field quality.
- **Edges & holes:** small chamfers protect the coating on handling edges; countersunk holes need coating coverage specified inside the hole.

5 RFQ Checklist — Get an Accurate Quotation Faster

Send us the items below and our team can usually move straight to technical review instead of a week of back-and-forth emails.

- ☐ **Grade or working conditions.** e.g., “N42SH” — or simply tell us the worst-case temperature and required flux, and we will propose the grade.
- ☐ **Dimensions + tolerances + drawing.** PDF or STEP; mark critical dimensions and the magnetization direction.
- ☐ **Coating & corrosion requirement.** Indoor / humid / salt-spray hours; whether the magnet will be bonded.
- ☐ **Quantity.** Samples needed now + estimated annual volume — pricing changes significantly with volume.
- ☐ **Application & environment.** Motor? Coupling? Sensor? Operating media? Even one sentence helps us flag risks early.
- ☐ **Delivery.** Target date and destination country — for air freight we arrange the magnetic inspection report (IATA PI 953) for you.

About XAK Technology

XAK Technology supplies custom magnetic materials, permanent magnets and magnetic assemblies for motors, robotics, oil & gas, medical and automation applications — from first sample through repeat production, with engineering support at every step.

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Email: info@xakmag.com | **Web:** xakmag.com | **Tel / WhatsApp:** +86 198 6049 7413